

# QUEST

ADVENTURES IN THE WORLD OF SCIENCE

**HEALTH AND MEDICINE**

**23**

**MORE PROJECTS**

**GIANT POSTER:  
AIR RESCUE**

**FACT FILES ON:**  
Healing forces  
Brain scans  
Health hazards  
Laser surgery  
The desktop doc  
The body's defences

**MODEL:  
THE HUMAN SKULL**

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FULLY  
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# INSIDE THIS PACK

## FACT FILES

- ▶ Bloodless cuts
- ▶ Modern drugs
- ▶ Alternative medicine
- ▶ Organ transplants
- ▶ Plastic surgery
- ▶ Microsurgery
- ▶ Artificial limbs



**MODEL** Make a human skull



## POSTER

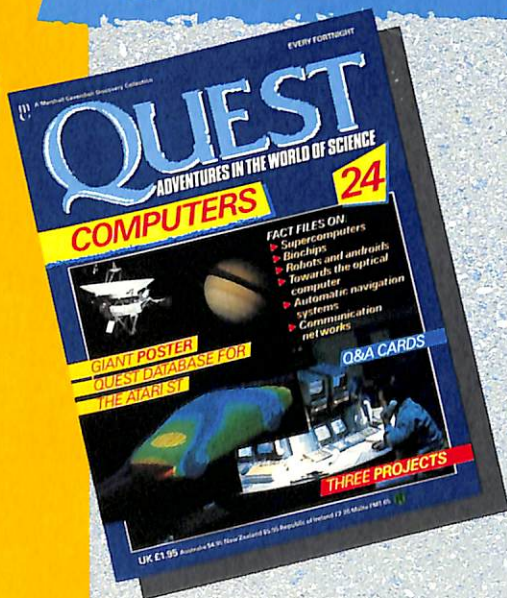
Flying ambulance



## MORE

SCIENTIFIC PROJECTS

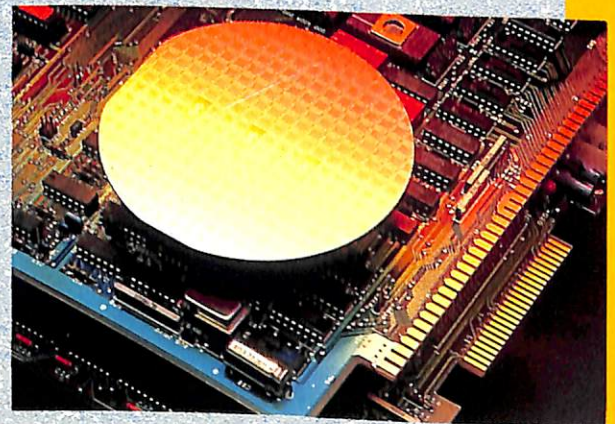
## IN QUEST 24 COMPUTERS



More In-Quest  
Q & A cards

## FACT FILES INCLUDE:

- ▶ Supercomputers
- ▶ Auto-guided vehicles
- ▶ Robots
- ▶ Computer graphics
- ▶ Flight simulators
- ▶ Fraud and hacking
- ▶ Data protection



## POSTER

The silicon chip

ISSN 1350-3766







# PROJECTS

## FARMING

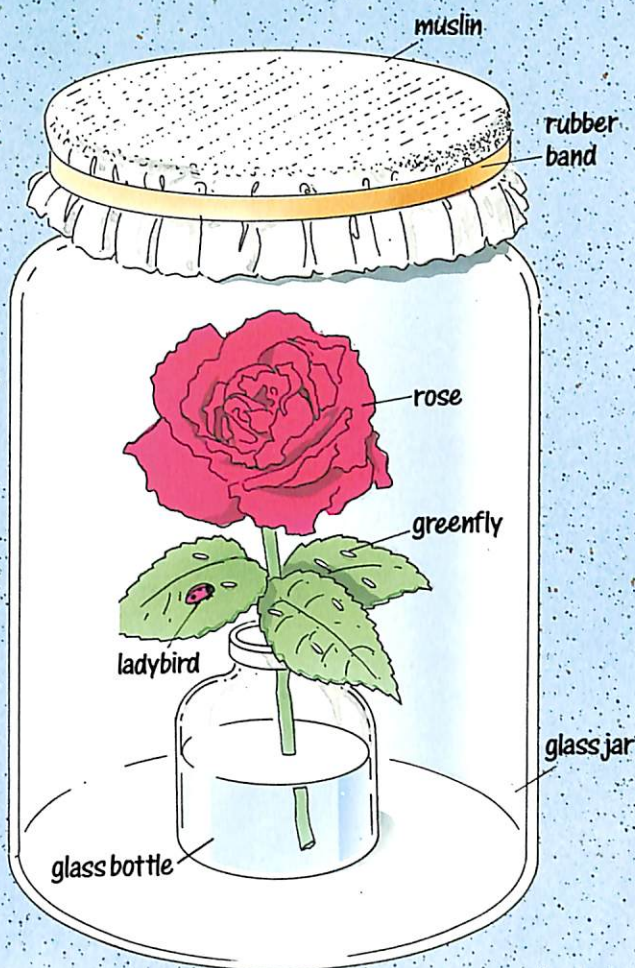
- How can biology help to keep crops free from pests?
- Use a notebook and pencil to record details of garden birds.
- Find out why plants are able to grow faster in greenhouses.

### NATURAL PREDATORS

1 2 3 4 5

Use a rose shoot with greenfly and a ladybird to see how 'biological control' can replace chemical pesticides.

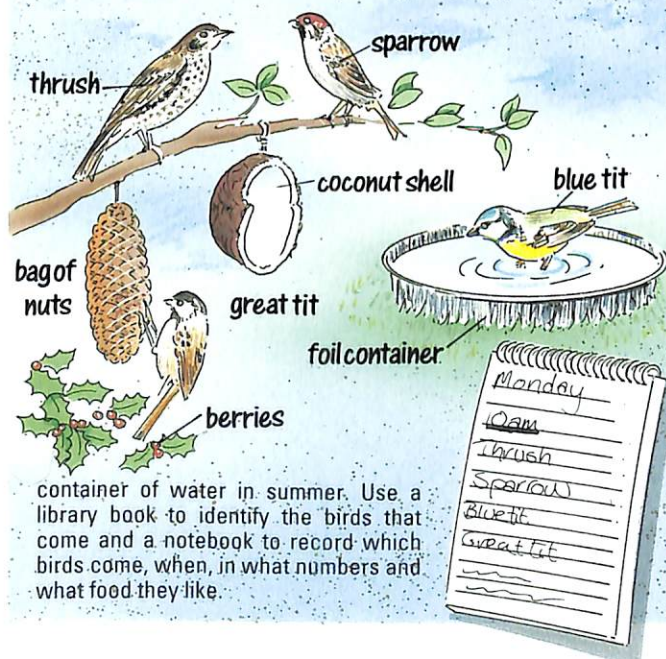
You will need a small muslin cloth, a thick rubber band, a small bottle and a large glass jar into which the bottle will easily fit. Wash both the bottle and jar in soapy water and dry them thoroughly. Find a rose bush that has greenfly on it and cut a flower and leafy shoot, about 10 cm long, with some greenfly on the leaves or stem. Place the cutting in the small bottle containing water as shown. Then put the bottle and cutting in the large glass jar. Wherever there are greenfly you will almost certainly find ladybirds. Gently take one and put it in the jar, then cover the top with the muslin cloth and secure it with the rubber band. Keep watch for a few days. The ladybird is a carnivore – an animal eater – and its favourite food are aphids, such as greenfly. The deliberate introduction of a predatory species of an insect like a ladybird on to a crop infested with aphids is known as 'biological control'. It is the natural alternative to using chemical pesticides that may find their way, through the crop, to Man. See how many greenfly the ladybird eats. After a few days you should free the ladybird in the garden.



### BIRDWATCHING

1 2 3 4 5

Ornithology, as the study of birds is called, is a good way to learn about animal behaviour. Attract birds to your garden by putting out food – bread, seeds, coconut or berries – for them in winter and a shallow

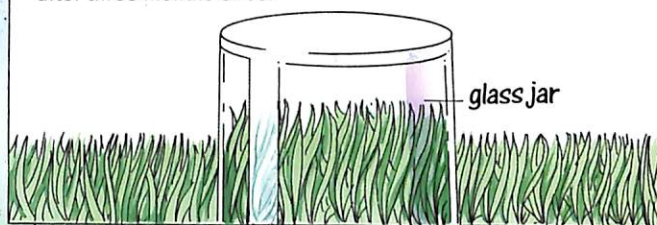


### THE GREENHOUSE

1 2 3 4 5

A greenhouse provides a warm atmosphere for growing plants. Sunlight passes through the glass and heats up the air, which cannot escape easily.

Take a glass jar and place it upside down on a closely cut lawn. Within a few days you will see that the grass inside this 'greenhouse' grows taller than that surrounding it. This is the essence of the greenhouse and it is why many young crops are raised under glass or, in many cases, beneath sheets of polythene that are designed to break down and disappear after three months or so.



### PROJECT INFORMATION

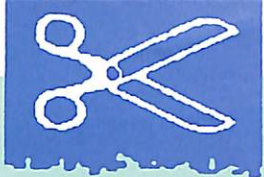
1 2 3 4 5

Each QUEST project has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

**WARNING!**

Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for injury.





# MODEL M-F 3600 TRACTOR

## ASSEMBLY INSTRUCTIONS

### You will need

Scissors • Ruler • Craft knife • Glue

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Use dotted lines as a guide for positioning the pieces and check the ASSEMBLY DIAGRAM before gluing.

**NB** Younger children will need supervision when using a craft knife.

### Chassis and cabin

**1** Cut out main body **A**. Fold and glue to shape.

**2** Cut out cabin **B**. Fold at roof to make four flaps (see ASSEMBLY DIAGRAM). Make light folds for rear side windows and for slight angle at panel below windshield. Fold tabs. Glue windshield and panel to sides. Glue rear windows to sides.

**3** Cut out cabin base **C**, fold and glue to tabs on **B**.

**4** Glue **B** to **A** following positioning marks (see ASSEMBLY DIAGRAM).

**5** Cut out counterbalance **D**, fold and glue to shape (see ASSEMBLY DIAGRAM). Glue **D** to **A** at position marked.

**6** Cut out left mudguard **F**. Fold slightly at dotted lines to make curve and fold tab. Apply glue to tab at back and down inner edge of **F** and glue to back of cabin base and underside of cabin.

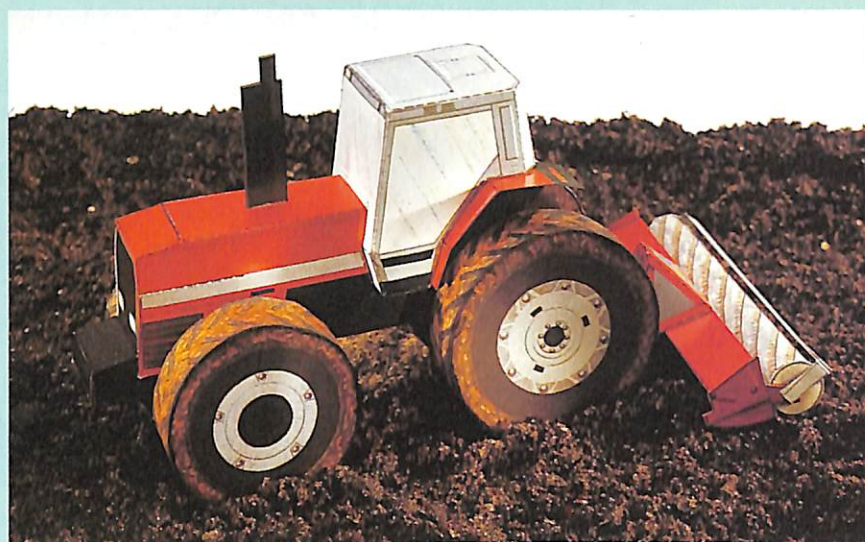
**7** Repeat with right mudguard **F**.

**8** Cut out chimney **G** and glue in position on top of **A**.

### Wheel assembly

**1** Cut out front gear box **H** (use a craft knife to cut out circles). Fold into box shape (see ASSEMBLY DIAGRAM) and glue at tabs. When dry, glue to underside front of **A** at position marked.

**2** Cut out front axle **I**. Make small cuts at



each end and roll into rod. Push through hole in **H**. Fan out ends of **I** to form tabs.

**3** Cut out inside of left front wheel **L**. Cut out tyre tread **J**. Apply glue to tab on end and to tabs on **L** and glue **L** and **J**.

**4** Cut out outside of left front wheel **M** (**K** on diagram) and glue to **J**.

**5** Glue wheel to axle at position marked.

**6** Repeat with right front wheel, **N**, **M** (tyre tread), **O**.

**7** Cut out rear gear box **P** (use a craft knife to cut out circles). Fold and glue to box shape. Glue one end first; allow to dry, then glue other end. Glue **P** to back of **C** at position marked.

**8** Cut out axle **Q**. Make small cuts at each end. Roll into rod and push through holes in **P**. Fan out ends to form tabs.

**9** Cut out outside of left rear wheel **S** and glue to tyre tread **R**. When dry, cut out inside of wheel **T** and glue to **R**.

**10** Repeat with right rear wheel, **U**, **V**, **W**.

### Cultivator

**1** Cut out cross-panel **X** and side pieces **Y** and **Z**. Glue together.

**2** Cut out **A**-frame **Ai** and fold and glue to pyramid shape (see ASSEMBLY DIAGRAM). Glue to **X** at position marked.

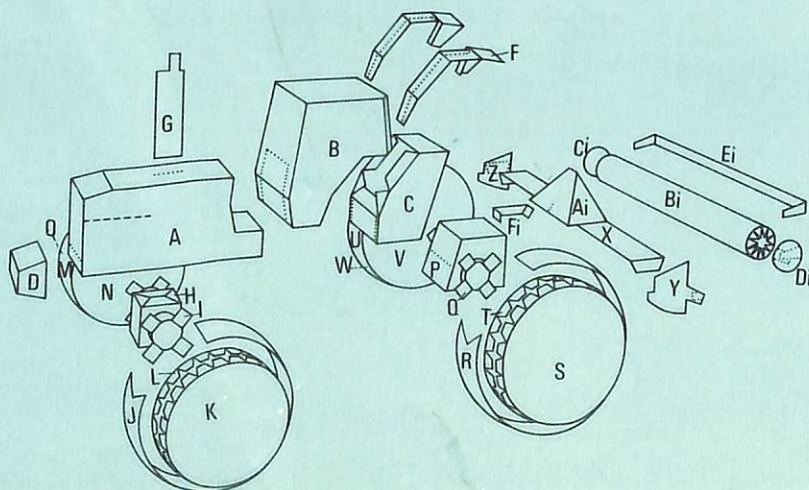
**3** Cut out cultivator drum **Bi**. Apply glue and roll into cylinder shape. Leave to dry.

**4** Cut out side pieces **Ci**, **Di**, and glue to **Bi**.

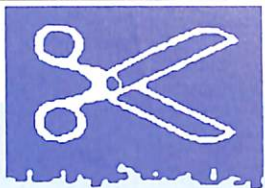
**5** Cut out mudguard **Ei** and glue on to **Ci** and **Di** at position marked.

**6** Cut out shaft **Fi** and glue to **Ai**. When dry, glue **Fi** at position marked on **P**.

**NB** Tractor's wheels should turn if you push it along a flat surface.







# MODEL

## ASSEMBLY INSTRUCTIONS

### You will need

Scissors • Ruler • Craft knife • Glue •  
Two cocktail sticks

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use dotted lines as a guide for positioning. Check position of pieces before gluing.

### To make up

#### Cranium

1 Cut out **A** and glue into oval shape. Do not fold tabs.

2 Cut out **B**, fold tabs and glue into oval shape.

3 Apply glue to inside tabs of **A** and glue **A** and **B** together, using dotted lines above eye sockets as a positioning guide.

4 Cut out **C**. Apply glue to tabs on **A** and stick **C** to **A**, matching up dotted line and cranial join on top of **A** with line and join on **C**. Leave to dry.

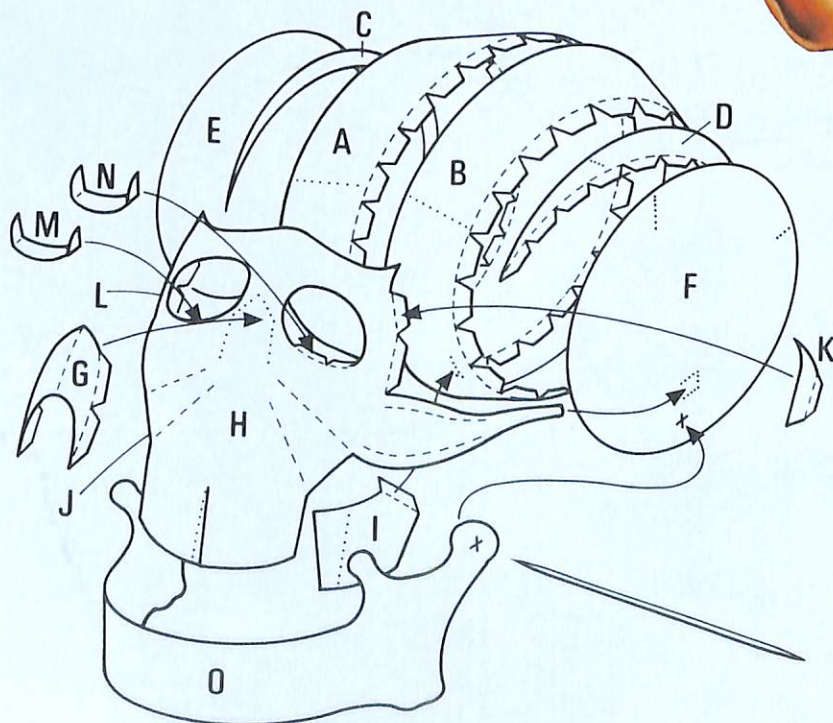
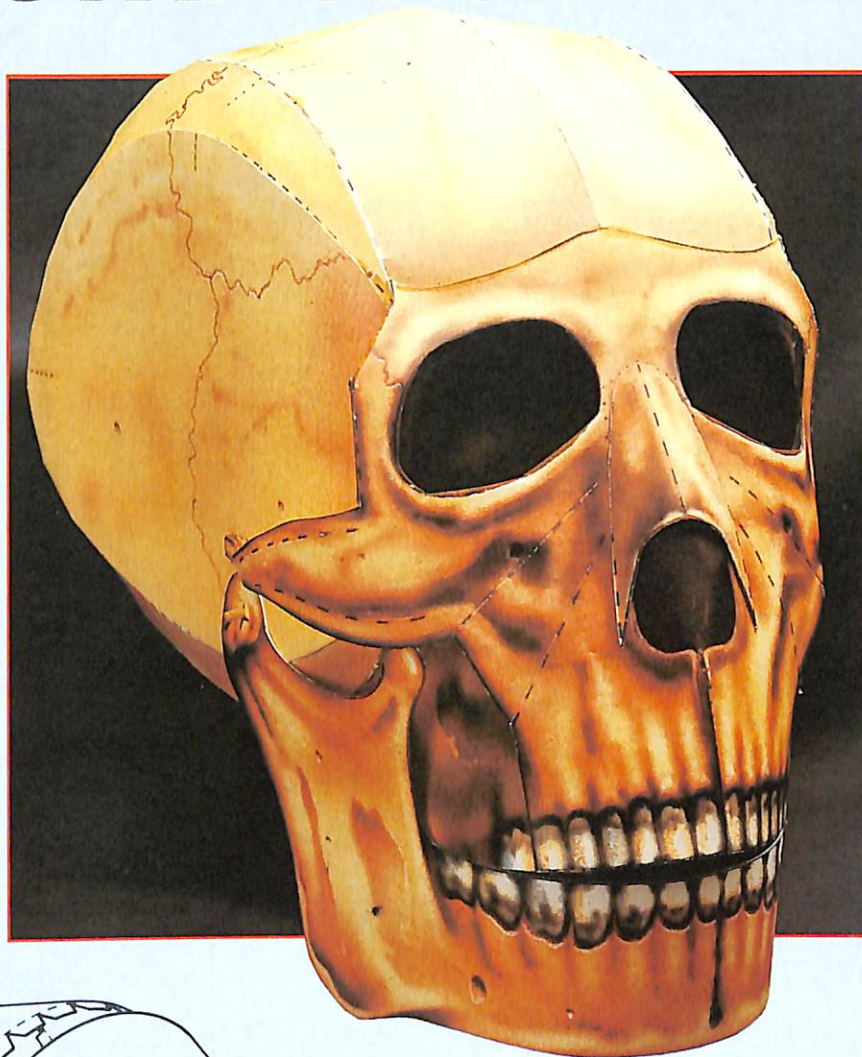
5 Cut out **D** and glue to tabs of **B**.

6 Cut out side **E**. Glue **E** to **C**, matching up dotted lines on **E** and **C**. Allow to dry.

7 Repeat with side **F**.

#### Face

1 Cut out nasal bone **G**. Cut out maxilla **H**. Use craft knife to cut out eye sockets. Glue



**G** to **H** at position marked on **H**. Allow to dry.

2 Score all dotted lines on **H** using a blunt edge and ruler, bend slightly then glue **H** along the top of **A/B** at dotted line. Glue side flaps of **H** at positions marked on **E** and **F**.

3 Cut out side **I**. Bend in slight curve. Glue **I** at position marked on underside of **B** and behind teeth on **H**, so that tooth on **I** matches.

4 Repeat with side **J**.

5 Cut out **K**. Glue to tabs on **H** and glue tab on **K** to **F**.

6 Repeat with **L**.

7 Cut out eye socket **M**, bend up ends slightly and glue in position on **H**.

8 Repeat with eye socket **N**.

#### To finish

9 Push a cocktail stick through **E** and **F** respectively at position marked.

10 Cut out jawbone **O**. Push **O** on to cocktail sticks at positions marked. Jawbone should move up and down.





# PROJECTS

## HEALTH AND MEDICINE

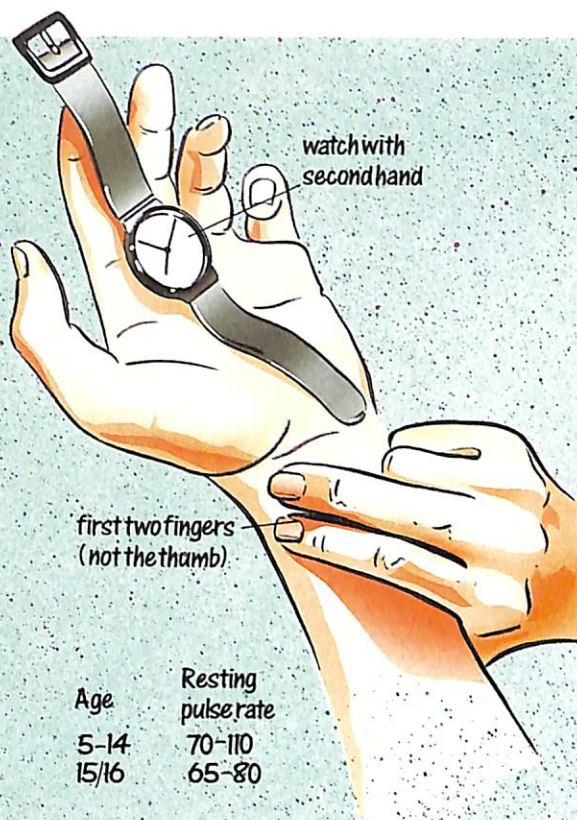
- The simplest way to check your health is to take your pulse.

### CHECKING YOUR PULSE



Pulse varies with age, but the lower it is and the faster your 'recovery' the fitter you are.

Find your pulse with your first two fingers – either on the wrist, just below the base of the thumb or on your neck, beside the Adam's apple. Count the number of beats in ten seconds and multiply by six. This is your pulse rate at rest. Now trot up and down a flight of stairs for two minutes, then check your pulse again immediately. It will be much higher. Wait 30 seconds and check again. Repeat every 30 seconds until it has returned to normal. This is your 'recovery' time and should not be more than 2 minutes.



watch with second hand

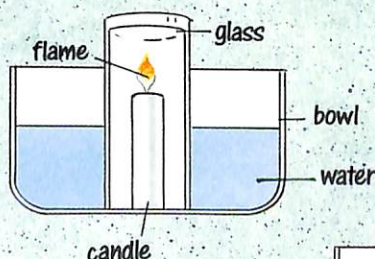
first two fingers (not the thumb)

Age	Resting pulse rate
5-14	70-110
15/16	65-80

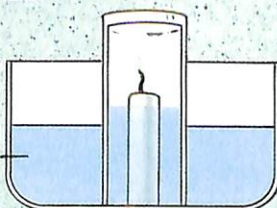
### HOW MUCH OXYGEN?



You need a glass mixing bowl, a candle and a glass jar big enough to fit over the candle with room to spare. Fill the bowl to the halfway mark with water. Put the candle in the middle of the water and light it then quickly put the jar over the candle. When the candle goes out, some water will be drawn into the jar. Measure the water that went up then do the experiment again and divide by two to get an average. Put the result over the height of the jar and cancel. This is the amount of nitrogen in the air and the rest is oxygen.



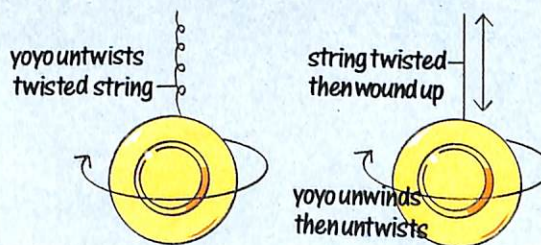
water level represents amount of oxygen in air



### GYROSCOPIC MOMENTUM



Take a yo-yo, twist the string, then release it. The yo-yo will unwind as you would expect. However, if you twist the string again but then wind up the yo-yo as normal the string will not untwist until the yo-yo stops spinning. This is because the yo-yo is acting as a gyroscope.



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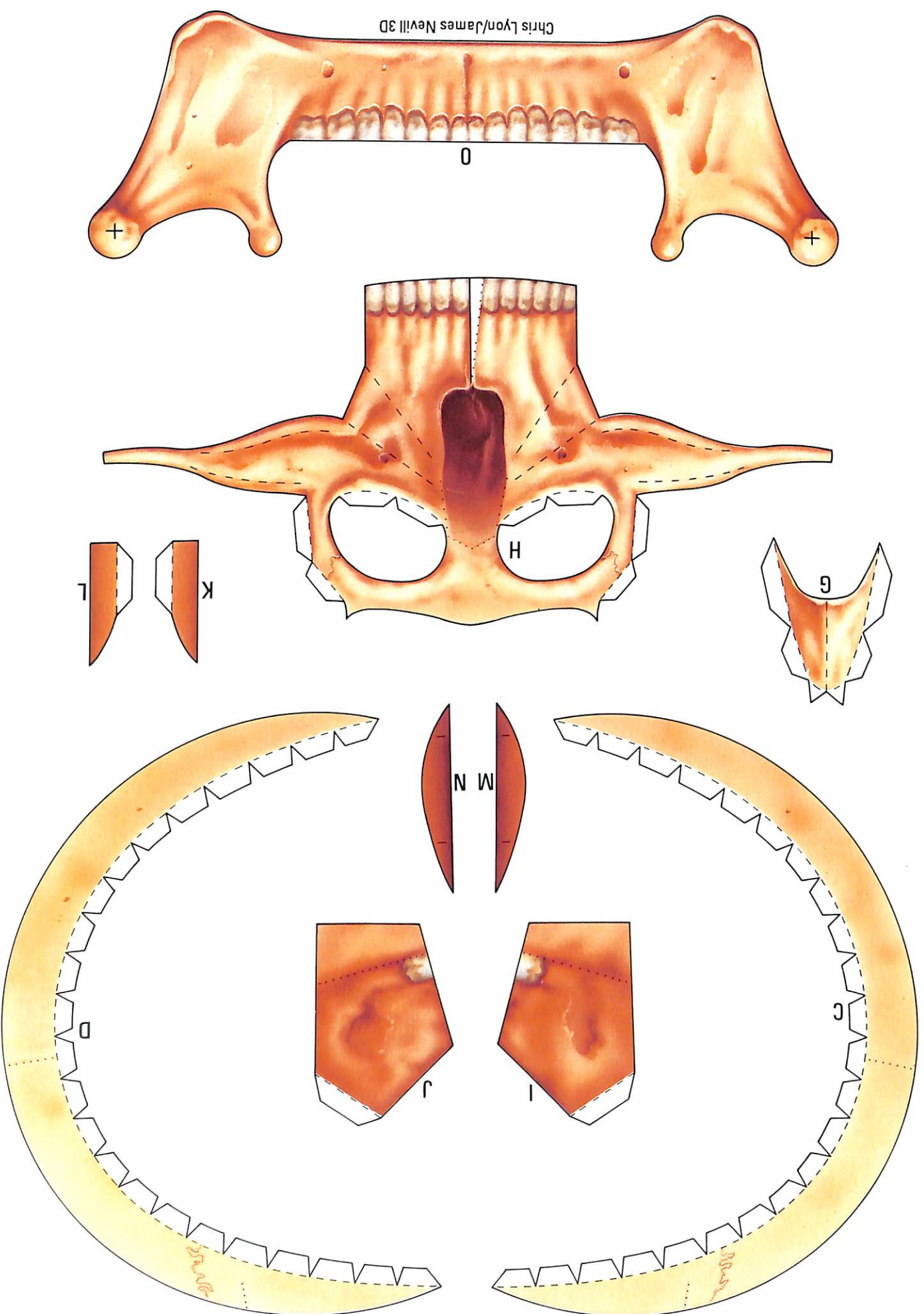
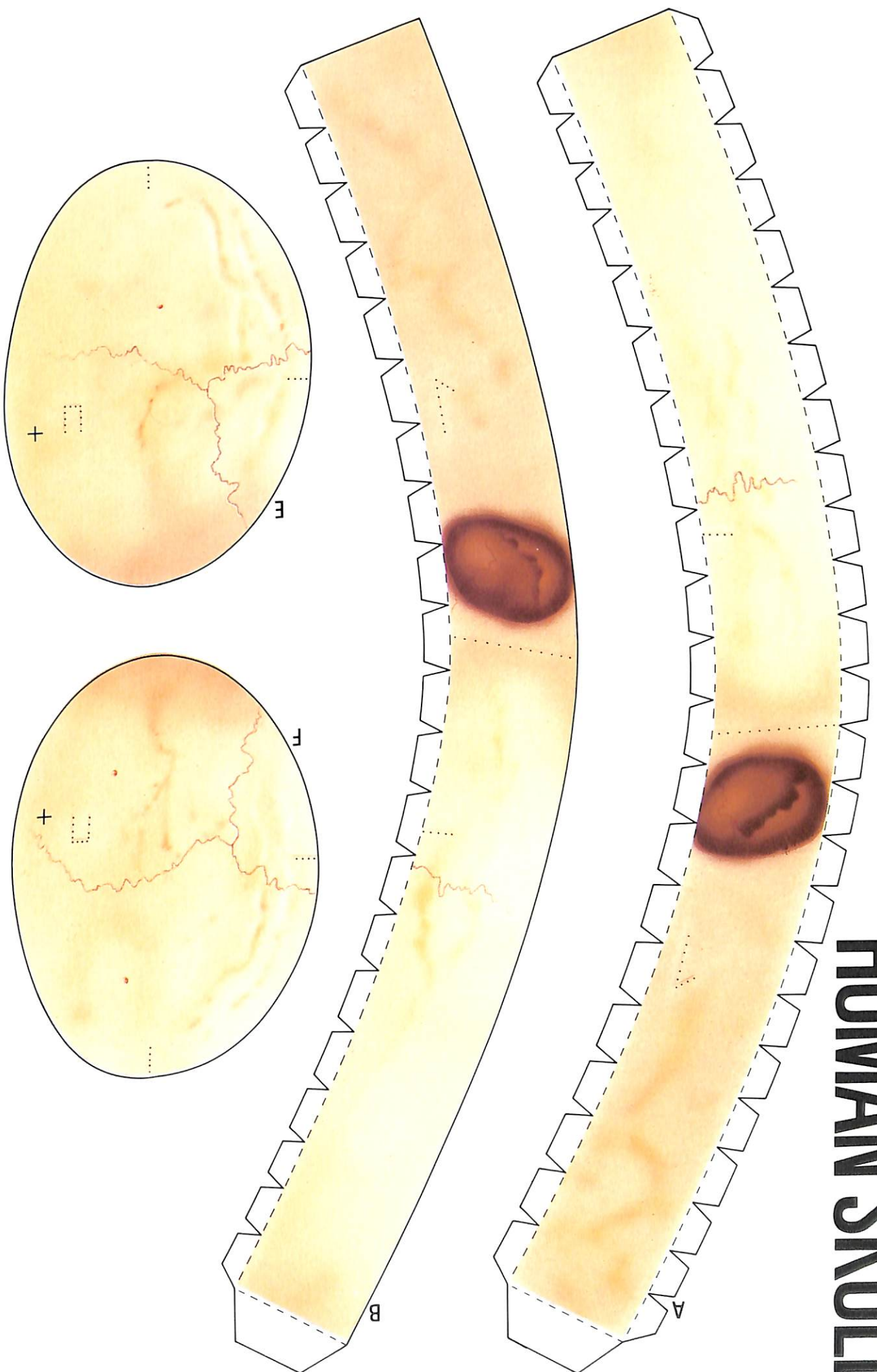


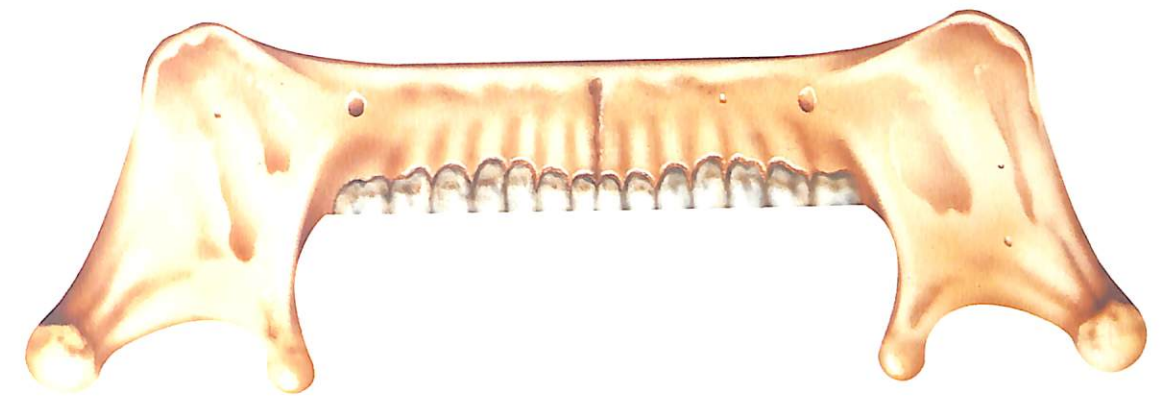
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**WARNING!**



# HUMAN SKULL









## THE AIRBORNE EYE CLINIC

An eye operation to prevent blindness is carried out on board the DC-8 jet of Operation Orbis. The plane is a flying operating theatre, travelling the world and saving the sight of thousands of people. The patients are generally people of the Third World who live far

from any hospital. Over 40 million people around the world suffer from eye diseases that can lead to blindness – yet two-thirds of these could be treated quite cheaply. Orbis is financed entirely by voluntary donations and patients receive treatment free.



*Even cows can need a lift. If the vet can't get to the cow, a rescue helicopter can take time off from its normal work to airlift the cow to the vet.*



## HOSPITALS IN THE SKY

The Australian flying doctor has long been a legend. Remote outback communities have been served by airborne medics flying light planes that are able to land on short, rugged airstrips. Today there is a growing demand for flying medical services in other countries, too.

One reason is the need for speed. As medicine progresses, ever more serious emergencies can be treated – provided the aid gets there in time. Secondly, organs for transplant surgery must be used as soon as possible; when the recipient is hundreds of kilometres away, an aircraft is often the answer.

Aircraft also make inaccessible places accessible. People who live in areas poorly served by road require other means of getting quickly to hospital. There are few such places a helicopter ambulance cannot reach.

Lastly, there is a growing desire to bring the best of modern medicine to the remotest areas of the Third World – flying clinics shrink the distances to these countries.

However, air rescue has its own special problems. A plane needs an airstrip on which to land, and that is not always available. Even a helicopter needs a flat landing area. Furthermore, operating aircraft and keeping them on standby is very costly.

# AIR RESCUE

**HIGH-SPEED AID BROUGHT BY FLYING MEDICS**

We thank the following for assistance: Express Newspapers HEMS Ltd; CB Group Ltd.



REGA



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## HIGHWAY PATROL

Speed is essential when someone is severely injured in a road crash. Every minute that passes without treatment increases the chance of death or permanent injury. Yet the road journey to the nearest hospital may take an hour or more. A helicopter ambulance can 'bring the hospital to the patient' within minutes. The airborne doctors or paramedics (medical assistants) can give emergency treatment while the patient is whisked to the most appropriate nearby hospital. The air journey is not only faster than a road journey – it can be smoother, too.

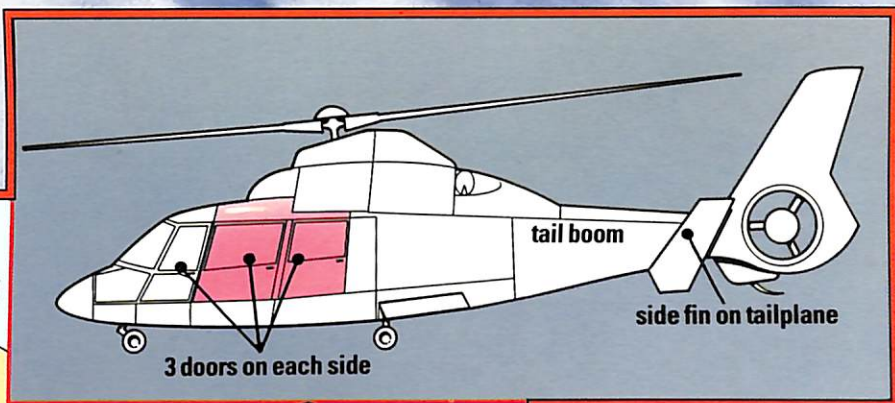
Gamma/Frank Spooner Pictures



QUEST



*High over the Alps a Swiss air ambulance races to an emergency in a remote mountain village. A helicopter is vital in areas where road transport would take many hours.*



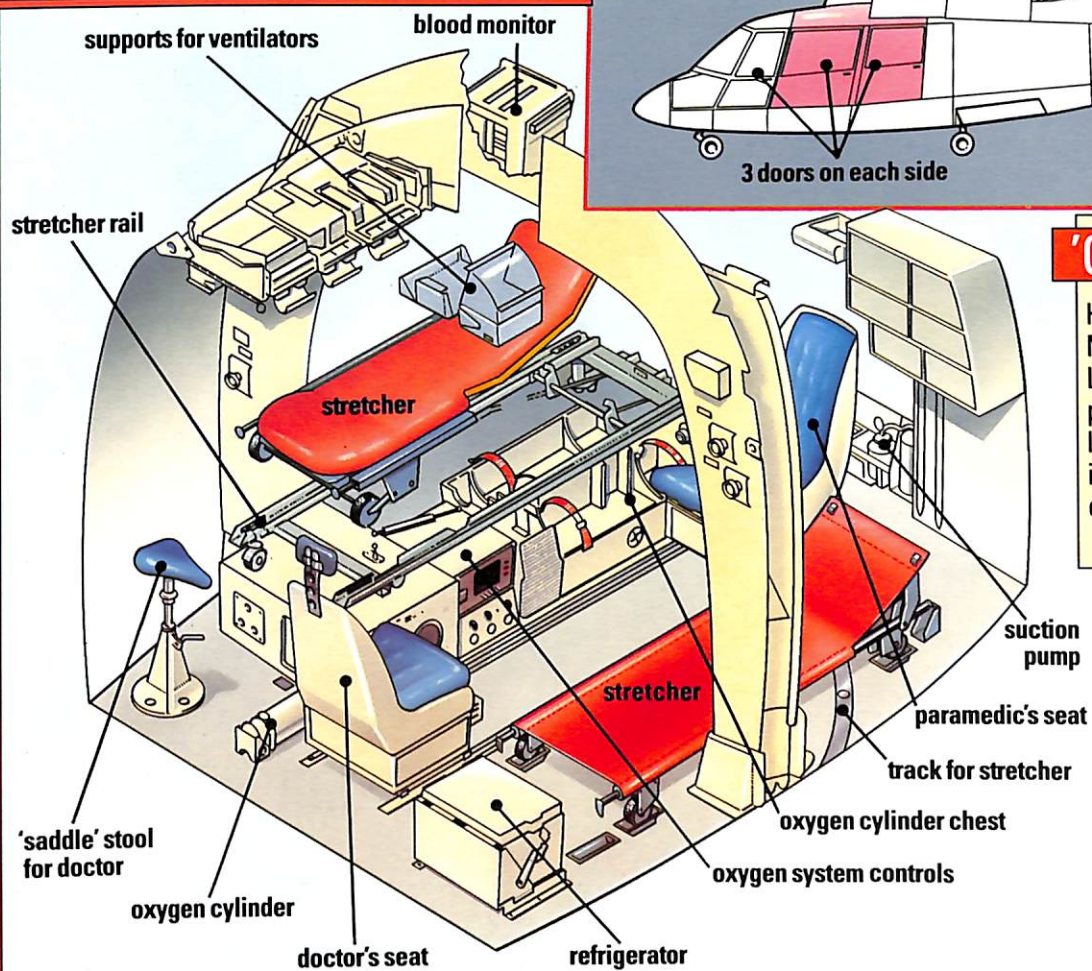
fied cabin can house two patients on stretchers, with a doctor and a paramedic. A pilot and copilot fly the machine. Medical equipment includes:

- blood monitors – one of them analyses blood composition by shining light through an earlobe or the flesh of a finger
- a supply system that distributes oxygen to several outlets in the craft
- portable and built-in ventilators to keep a patient breathing
- a suction pump for such jobs as clearing a patient's breathing passages

## 'COPTER ON CALL

HEMS (Helicopter Emergency Medical Service) covers Greater London (UK), using a French Dauphin helicopter. The Dauphin is licensed to fly over cities because it can keep airborne even if either of its twin engines breaks down.

The helicopter's specially modi-



# AIR